

AN ANNOTATED LIST OF THE CULICIDAE OF
WASHINGTON

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The present paper is an annotated list of 31 species of Culicidae known from Washington. Of these, 24 species have been collected by the author mostly during the past two years and mostly within a 50-mile radius of Seattle. Localities and dates are given and generalizations on the biology of the different species are made from field notes taken by the author. Localities and dates of other authors are given, but their remarks on habits have been omitted except in a few indicated cases.

The mosquitoes in Washington are not of great importance as vectors of disease. However, encephalitis is endemic in the Yakima Valley and *Culex tarsalis* Coq. has been demonstrated as the chief vector of this disease. *C. pipiens* L. and *Culiseta inornata* (Will.) are considered vectors of possible importance when found in sufficient numbers (11). *Anopheles freeborni* Ait. is the only vector of malaria in the state, but this disease has been infrequent during recent years (10). Mosquitoes also present a serious pest problem in many areas. *Aedes lateralis* Meig. and *A. vexans* (Meig.) are extremely bothersome near rivers following flooded conditions. *Culex pipiens* L. is a serious pest in residential areas of Seattle and Tacoma where control measures are found necessary. The mosquitoes of mountainous areas cause great annoyance to vacationists. Such mosquitoes as *Aedes nearcticus* Dyar attack viciously during the day along the higher mountain trails. Other recreational areas are spoiled by the number of mosquitoes present. Stage (18) reports *A. aboriginis* Dyar and *A. fitchii* (F. and Y.) as being troublesome around summer homes on Bainbridge Island. *A. cinereus* (Meig.) and *A. varipalpus* (Coq.) are also important in this respect in restricted areas. The author found *A. dorsalis* (Meig.) extremely annoying at Soap Lake and Dry Falls, and they are probably as bad in other areas where they occur. Most of the mosquitoes found in the state are probably occasionally annoying, but are usually limited in their range and numbers.

In identification of material, keys by Matheson (13) and Gjullin (9) were found helpful. However, in a few cases certain characteristics, not included in these keys, were found useful. In the larvae of *Culiseta inornata* (Will.) the tuft on the posterior margin of the plate was found to be double and quite heavy while in the larvae of *C. incidens* (Thom.), which is very similar, this hair is occasionally triple, shorter, and noticeably less robust. In the adults the white tarsal bands of *C. incidens* (Thom.) are frequently indistinct, but the adults of this species are easily distinguished from *C. impatiens* (Walk.), which it closely resembles, by the much heavier wing spots.

Matheson (13) considers *Aedes aloponotum* Dyar as being indistinct from *A. excrucians* (Walk.). However, certain characteristics present on larvae and adults collected during this period seem to warrant leaving this mosquito as a valid species. The larvae closely follow the descriptions of *A. flavescens* (Müll.), differing from *excrucians* in having double lateral hairs on the first to sixth segments, the lower head hairs usually double, but occasionally triple, and the upper head hairs triple and occasionally in fours. One to two terminal pecten teeth are more widely separated than the others and are nearly thornlike in appearance. The body is densely covered with small spicules. The adults closely resemble Dyar's (1) type description. The male genitalia differ from the description of *excrucians* in having a small bifurcation at the tip of the claw of the clasper and having what appears to be a sub-basal lobe. The apical lobe is longer than it is in *excrucians*.

Aedes aboriginis Dyar has been omitted from the key to larvae by Matheson (13). The larvae of *aboriginis* key out to the couplet containing *pullatus*, *pionips*, and *canadensis* in this key. *Pullatus* has long, pointed anal gills and occurs in the high mountains; *aboriginis* has shorter gills, little longer than the anal segment, and is found in the low coastal regions. *Pionips* and *canadensis* have not been recorded from the state, but *aboriginis* differs from these in not having slipper shaped comb scales and with more or less equal spines on these scales.

Aedes lateralis Meig. has been omitted from the key to adult *Aedes* by Gjullin (9), but can be found in Matheson's key.

Localities are listed by counties with dates for each collection following the specific locality. Larval collections are noted by (L)

and adult collections by (A) after the date of collection. Numbers following some of the localities correspond to references in the bibliography. Records from mosquitoes in the possession of M. K. Mondala are indicated by his name.

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ANNOTATED LIST OF SPECIES

1. *Eucorethra underwoodi* Underwood. Probably breeds throughout the year, frequently in deep, cold pools. GRAYS HARBOR co.: Hoquiam 5-27-17 (6); KING co.: Paradise Lake 3-31-46 (L). Seattle 2-8-47 (L); MASON co.: Lake Cushman 6-21-17 (6); SNOHOMISH co.: Chase Lake 5-8-46 (L); THURSTON co.: Olympia 3-31-94 (6). LARVAL ASSOCIATIONS: *Culiseta morsitans* (Theo.).

2. *Mochlonyx cinctipes* (Coquillett). Fairly common, at least in western Washington. Larvae found in situations similar to *Chaoborus nyblaei* Zett. KING co.: Echo Lake 3-19-47 (L), 4-8-46 (L), Seattle, 2-1-47 (L), 2-8-47 (L), 2-16-47 (L), 3-1-47 (L), 3-19-47 (L), 4-18-46 (L), Tukwila 5-5-46 (L); SNOHOMISH co.: Alderwood Manor 3-1-47 (L). LARVAL ASSOCIATIONS: *Chaoborus nyblaei* Zett., *Aedes aloponotum* Dyar., *A. aboriginis* Dyar., *A. cinereus* (Meig.).

3. *Chaoborus nyblaei* Zetterstedt. Very common, breeding chiefly in deep pools, marshes, and lake edges. Probably breeds throughout the year. Larvae feed extensively on Copepods. KING co.: Echo Lake 3-19-47 (L), 4-8-46 (L), Seattle 1-11-47 (L), 2-16-47 (L), 3-19-47 (L), 4-18-46 (L), Tukwila 5-5-46 (L); KITSAP co.: Bremerton (6); MASON co.: Hoodspout 5-6-24 (6); SNOHOMISH co.: Edmonds 3-22-47 (L). LARVAL ASSOCIATIONS: *Mochlonyx cinctipes* (Coq.), *Aedes aloponotum* Dyar, *A. aboriginis* Dyar, *A. cinereus* (Meig.).

4. *Anopheles punctipennis* Say. Found to be fairly common in the southwestern area. Larvae collected generally in open, perma-

ment, grassy-edged ponds. GRAYS HARBOR CO.: Malonne 7-5-47 (L), Oakville 7-5-47 (L); KING CO.: Carnation 6-12-47 (A), Kennydale 6-15-46 (L); PIERCE CO.: Ashford 8-5-06 (4), Tacoma 6-22-47 (L); THURSTON CO.: McKenna 7-5-47 (L), Rochester 7-5-47 (L); WHATCOM CO.: Custer 3-29-47 (A). Gjullin and Yates (10) give the following additional counties: CHELAN, CLALLAM, CLARKE, COLUMBIA, COWLITZ, GARFIELD, KITITAS, LEWIS, MASON, OKANOGAN, SPOKANE, WALLA WALLA, WHITMAN, YAKIMA. LARVAL ASSOCIATIONS: *Culex apicalis* Say, *C. tarsalis* Coq., *C. pipiens* L.

5. *Anopheles freeborni* Aitken. One collection taken from a permanent, open, grassy pond. KITITAS CO.: Ellensburg 8-11-46 (L). Gjullin and Yates (10) give the following additional counties: ASOTIN, BENTON, CLALLAM, CLARKE, COLUMBIA, COWLITZ, OKANOGAN, SKAMANIA, SPOKANE, STEVENS, WALLA WALLA, WHATCOM, WHITMAN, YAKIMA. LARVAL ASSOCIATIONS: *Culex tarsalis* Coq.

6. ANOPHELES OCCIDENTALIS Dyar and Knab. Rare. STEVENS CO.: Valley (10); WHATCOM CO.: Lake Whatcom 5-31-17 (L) (1)¹.

7. Aedes NIGROMACULIS (Ludlow). YAKIMA CO.: Yakima Valley (A) (14).

8. Aedes FITCHII (Felt and Young). Larvae generally collected from grassy, open habitats. CLALLAM CO.: Port Angeles 4-20-46 (L); GRANT CO.: Dry Falls 5-11-46 (L); ISLAND CO.: Deer Lagoon, Whidbey Is. 3-28-47; KING CO.: Bothel 4-22-46 (L), Seattle 4-15-46 (L), 4-19-46 (L), 4-27-46 (L); KITITAS CO.: Cle Elum 3-25-47 (L); KITSAP CO.: Bainbridge Is. Late May to June 22, 1932 (15); MASON CO.: Hoodspout (L) (5), Lake Cushman 6-7-17 (4). LARVAL ASSOCIATIONS: *Aedes aloponotum* Dyar, *A. increpitus* Dyar, *A. aboriginis* Dyar, *A. cinereus* (Meig.).

9. Aedes ALOPONOTUM Dyar. Larvae found in a flooded, semi-open pond and nearby marshy areas. Adults captured while attacking in early evening. KING CO.: Seattle 3-19-47 (L), 4-15-46 (L), 4-19-47 (L), 4-27-46 (L), 5-4-46 (L), 6-12-46 (A), 7-31-47 (A); MASON CO.: Hoodspout 7-6-20, 7-7-20 (A) (2), Lake Cushman 6-28-17 (A) (1), 7-3-20, 7-4-20, 7-5-20 (A) (2); PIERCE CO.: Ashford 8-1-06 (A) (2); SKAGIT CO.: Mt. Vernon 3-28-47

¹This should be considered a doubtful record because Dyar lost the larvae before confirmation of his field identification.

(L); WHATCOM CO.: Custer 4-20-47 (L). LARVAL ASSOCIATIONS: *Aedes fitchii* (F & Y), *A. aboriginis* Dyar, *A. cinereus* (Meig.), *Mochlonyx cinctipes* (Coq.), *Chaoborus nyblaei* Zett.

10. *Aedes increpitus* Dyar. Larvae collected from flooded meadows and grassy marshes. Quite common. Larvae appear very early in spring. Adults caught while biting in wooded areas during the day. GRANT CO.: Park Lake 5-11-46 (A); ISLAND CO.: Deer Lagoon, Whidbey Is., 3-28-47 (L); LINCOLN CO.: Creston 6-1-44 (Mondala); MASON CO.: Lake Cushman 6-27-17 (A) (1); SNOHOMISH CO.: Edmonds 2-16-47 (L), 3-1-47 (L), 3-8-47 (L), 3-16-47 (L), 3-22-47 (L); SPOKANE CO.: Spokane 7-12-17 (4); STEVENS CO.: Chewalah 6-10-44 (Mondala), Kettle Falls 6-10-44 (Mondala); YAKIMA CO.: Yakima Valley (A) (14). LARVAL ASSOCIATIONS: *Aedes fitchii* (F&Y), *A. aboriginis* Dyar.

11. *Aedes campestris* Dyar & Knab. One collection of larvae taken in the grassy edges of a semi-permanent lake. Adults captured while biting in bright sunlight. GRANT CO.: Lower Coulee 5-3-47 (L), Dry Falls 5-4-47 (A).

12. *Aedes dorsalis* Meigen. Larvae found in grassy, temporary pools. One collection taken from slightly alkaline water. Adults caught while biting in the evening. GRANT CO.: Soap Lake 5-3-47 (L), 5-11-46 (A, L); KING CO.: West Seattle 8-11-06 (4), Seattle 6-30-17 (A) (1); OKANOGAN CO.: Oroville 6-6-19 (4); PIERCE CO.: Tacoma 6-30-46 (L); WHATCOM CO.: Bellingham 5-31-17 (A) (1); YAKIMA CO.: Morse Creek 7-19-47 (A), Moxee 8-14-44 (Mondala), Naches 8-14-41 (Mondala). LARVAL ASSOCIATIONS: *Culex tarsalis* Coq., *C. pipiens* L., *Culiseta inornata* (Will.).

13. *Aedes aboriginis* Dyar. Common, but apparently restricted to western Washington. Larvae usually found in edges of open marshes and deep-sided, grassy-edged, temporary pools. Probably the earliest appearing larvae in the spring. Adults found attacking in wooded areas during the day and early evening. GRAYS HARBOR CO.: Hoquiam 5-27-04 (A) (1); ISLAND CO.: Deer Lagoon, Whidbey Is. 3-28-47 (L); KING CO.: Bothel 3-1-47 (L), Newcastle 3-24-47 (L), Seattle 2-15-47 (L), 2-16-47 (L), 3-1-47 (L), 3-19-47 (L), 5-5-46 (A); KITSAP CO.: Bainbridge Is. April, 1932 (16), Bremerton, last of April, 1924 (L) (5), Kingston 6-2-46 (A); MASON CO.: Lake Cushman 6-26-17, 6-27-17 6-28-17 (5); PIERCE CO.: Ashford 8-1-06 (A) (5), Longmire 5-10-47 (L), 6-17-17 (L) (5), Yelm 6-1-46 (A); SKAGIT CO.: Conner 3-28-47

(L), Mt. Vernon 3-28-47 (L); SNOHOMISH CO.: Alderwood Manor 3-1-47 (L), Chase Lake 3-1-47 (L), Edmonds 2-16-47 (L), 3-1-47 (L), 3-8-47 (L), 3-16-47 (L), 3-22-47 (L), 4-19-47 (L), 6-9-46 (L); WHATCOM CO.: Glacier 6-3-17 (A), Mt. Baker (foot) (5). LARVAL ASSOCIATIONS: *Mochlonyx cinctipes* (Coq.), *Chaoborus nyblaei* Zett., *Aedes fitchii* (F&Y), *A. aloponotum* Dyar, *A. increpitus* Dyar, *Culiseta impatiens* Dyar.

14. *Aedes communis* (De Geer). PIERCE CO.: Mt. Rainier, Indian Henry's 6-13-17 (L) (1), Mt. Rainier 8-3-06 (A) (1).

15. *Aedes hexodontus* Dyar. Apparently restricted to high mountainous regions. Larvae collected from a grassy pool at the foot of a snow bank. PIERCE CO.: Chinook Pass 8-10-46 (L). LARVAL ASSOCIATIONS: *Aedes nearcticus* Dyar, *A. pullatus* (Coq.).

16. *Aedes idahoensis* (Theobald). OKANOGAN CO.: Okanogan (4).

17. *Aedes lateralis* Meigen. Very common breeder in the flood-waters of the larger rivers (3). This mosquito has been studied extensively and reported in several papers (20). COWLITZ CO.: 6-13-33 (A) (17), Longview 7-20-44 (Mondala); KING CO.: Lake Tapps 7-14-34 (Mondala); PACIFIC CO.: Oysterville 6-21-18 (4); SKAMANIA CO.: 6-16-33 (A) (17); WHATCOM CO.: Sumas 7-15-20 (1); YAKIMA CO.: Yakima Valley (A) (14).

18. *Aedes nearcticus* Dyar. Larvae collected from a grassy pool at the foot of a snow bank. Adults fierce biters, found attacking in the open and at late afternoon. Apparently restricted to high mountainous regions. PIERCE CO.: Chinook Pass 8-10-46 (A, L), Mt. Rainier (13). LARVAL ASSOCIATIONS: *Aedes hexodontus* Dyar, *A. pullatus* (Coq.).

19. *Aedes pullatus* (Coquillett). Larvae collected from a grassy pool at the foot of a snow bank and in a deep, sunken valve-box filled with snow-water. Apparently restricted to high altitudes. PIERCE CO.: Chinook Pass 7-20-47 (L), 8-10-46 (L); Olympic National Forest (no county given), 4-19-43 (L) (16). LARVAL ASSOCIATIONS: *Aedes hexodontus* Dyar, *A. nearcticus* Dyar.

20. *Aedes ventrovittis* Dyar. "Occurs locally at high altitudes north into Washington" (7).

21. *Aedes varipalpus* (Coquillett). Stage (18) reports finding larvae in an oak stump filled with rain water and Dyar (1)

found them in a similar situation. Females were collected while biting in the evening. Males were caught while swarming around humans along a heavily wooded road during mid-afternoon. KING co.: Kent 6-20-07 (4), Seattle 5-30-46 (A), 7-31-06 (4); KITSAP co.: Kingston 6-2-46 (A); LEWIS co.: Randall 4-12-38 (L) (18); MASON co.: Lake Cushman 7-4-20 (4); PIERCE co.: Longmire Springs 6-11-17 (L) (1), Yelm 6-1-46 (A); YAKIMA co.: American River 8-1-46 (A).

22. *Aedes vexans* (Meigen). Very common breeder in the flood-waters of the larger rivers (3). This mosquito has been studied extensively and reported in several papers (20). YAKIMA co.: Moxee 8-9-41 (Mondala), Naches 4-14-44 (Mondala), Sunnyside 9-10-41 (Mondala), Yakima 5-24-41 (Mondala); WHATCOM co.: Sumas 7-15-20 (A) (3). Common along the lower Columbia River (18).

23. *Aedes cinereus* (Meigen). Larvae common in spring and early summer, found generally in shaded, deep-sided ponds with either grassy or naked edges. Adults captured while biting during the day, but in shaded areas. KING co.: Camp Mason 5-30-46 (A), Echo Lake 3-19-47 (L), Newport 6-15-46 (L), North Bend 5-30-46 (A), Seattle 4-19-47 (L), 4-27-46 (L), 5-4-46 (L), 5-20-46 (L), Tukwila 5-5-46 (L); MASON co.: Hoodspout (L) (5), Lake Cushman 6-26-17 (1); PIERCE co.: Mt. Rainier 8-3-06 (4); WHATCOM co.: Glacier 6-13-17 (L) (1); YAKIMA co.: Yakima Valley (A) (14). LARVAL ASSOCIATIONS: *Mochlonyx cinctipes* (Coq.), *Choborus nyblaei* Zett., *Aedes fitchii* (F&Y), *A. aloponotum* Dyar, *Culex apicalis* Adams, *C. tarsalis* Coq., *C. pipiens* L.

24. *Culex apicalis* Adams. Never abundant. Larvae found generally in the grassy, deeper edges of permanent ponds, marshes, and lakes. One collection of larvae taken from a Sphagnum bog. GRAYS HARBOR co.: Malonne 7-5-47 (L); KING co.: Newport 6-15-46 (L), Snoqualmie Pass 8-11-46 (L); SNOHOMISH co.: Chase Lake 6-9-46 (L), Silver Lake 6-5-46 (L); WHATCOM co.: Glacier 6-2-17 (L) (1), Sumas 6-2-17 (A) (1); YAKIMA co.: Naches River 8-11-46 (L). LARVAL ASSOCIATIONS: *Anopheles punctipennis* Say, *Aedes cinereus* (Meig.), *Culex tarsalis* Coq., *Culiseta incidens* (Thom.).

25. *Culex tarsalis* Coquillett. Larvae collected from areas similar to *Culex pipiens* L. Collections also made from alkaline

water. Very common throughout the state. GRANT CO.: Alkali Lake 5-11-46 (L), Coulee City 5-11-46 (L), Soap Lake 5-11-46 (L); GRAYS HARBOR CO.: Hoquiam 5-27-47 (A) (1), Malonne 7-5-47 (L), Oakville 7-5-47 (L); KING CO.: Bothel 4-26-47 (L), 4-27-46 (L), 5-5-46 (L), Kenneydale 6-15-46 (L), Renton 5-5-46 (L), Seattle 1-5-47 (A), 5-20-46 (L), 5-30-46 (L), 6-22-47 (A) (1); KITITAS CO.: Ellensburg 8-11-46 (L); LEWIS CO.: Centralia 5-28-47 (A) (1); OKANOGAN CO.: Okanogan 6-13-44 (Mondala); PIERCE CO.: Ashford 6-10-47 (A) (1), Tacoma 6-22-47 (L), Sunrise, Mt. Rainier 8-10-46 (L); WALLA WALLA CO.: Touchet 5-2-42 (Mondala); WHATCOM CO.: Bellingham 5-31-47 (A) (1); YAKIMA CO.: Yakima 8-12-41 (Mondala). LARVAL ASSOCIATIONS: *Anopheles punctipennis* Say, *A. freeborni* Ait., *Aedes dorsalis* (Meig.), *A. cinereus* (Meig.), *Culex pipiens* L., *Culiseta inornata* (Will.), *C. incidens* (Thom.).

26. CULEX PIPIENS Linnaeus. Larvae collected from permanent ponds, marshes, and lake edges, frequently being in areas that dry up later in the summer. Present both in foul and fresh water. Very common pest in western Washington. CLALLAM CO.: Sequim 8-10-44 (Mondala); GRAYS HARBOR CO.: Aberdeen (12); KING CO.: Redmond 4-26-47 (L), Seattle 1-5-47 (A), 1-22-47 (A), 4-7-46 (A), 5-20-47 (L), 6-4-47 (L), 6-23-47 (L); PIERCE CO.: Tacoma 6-22-47 (L), 6-30-46 (L); SNOHOMISH CO.: Edmonds 6-9-46 (L), 7-14-46 (L); YAKIMA CO.: Yakima 8-11-41 and 8-18-41 (Mondala). LARVAL ASSOCIATIONS: *Anopheles punctipennis* Say, *Aedes dorsalis* (Meig.), *A. cinereus* (Meig.), *Culex tarsalis* Coq., *Culiseta inornata* (Will.), *C. incidens* (Thom.).

27. CULISETA MORSITANS (Theobald). One collection made from a Sphagnum bog. SNOHOMISH CO.: Chase Lake 5-8-46 (L); YAKIMA CO.: Yakima Valley (A) (1). LARVAL ASSOCIATIONS: *Eucorethra underwoodi* Und.

28. CULISETA INORNATA (Williston). Common species. Larvae found in a variety of habitats including alkaline, foul, and fresh water, but usually in open areas. CLALLAM CO.: Sequim 6-27-44 (A) (Mondala); GRANT CO.: Soap Lake 5-11-46 (L); OKANOGAN CO.: Okanogan 6-27-44 (Mondala); PIERCE CO.: Tacoma 6-30-46 (L); SNOHOMISH CO.: Edmonds 6-9-46 (L), 6-15-46 (L), 7-14-46 (L); YAKIMA CO.: Yakima Valley (A) (14). LARVAL ASSOCIATIONS: *Aedes dorsalis* (Meig.), *Culex tarsalis* Coq., *C. pipiens* L., *Culiseta incidens* (Thom.).

29. *CULISETA IMPATIENS* (Walker). Larvae taken from deep-sided marsh pools, and a woodland pool in a dry creek bed. Adults collected off clothing during the day; none biting. KING co.: Camp Mason 6-1-46 (A); MASON co.: Lake Cushman 6-26-17 (L) (1); PIERCE co.: Longmire Springs 6-11-17 (A) (1); SKAGIT co.: north of Darington 6-29-47 (L); SNOHOMISH co.: Edmonds 6-9-46 (L); WHATCOM co.: Glacier 6-3-17 (A).

30. *CULISETA INCIDENS* (Thomson). Larvae collected from a variety of habitats; Sphagnum bog, meadow, pond, and foul water. Adults were collected while biting. GRANT co.: Dry Falls Lake 5-4-47 (L); GRAYS HARBOR co.: Hoquiam 5-27-15 (A) (1); KING co.: Enumclaw 6-27-44 (Mondala), Greenwater 6-17-44 (Mondala), Paradise Lake 3-31-46 (A), Redmond 4-26-47 (L), Seattle 6-22-17 (A) (1); LEWIS co.: Centralia 5-28-17 (A) (1); PIERCE co.: Ashford 6-10-17 (A) (1), Tacoma 6-30-46 (L); SNOHOMISH co.: Chase Lake 6-9-46 (L), Edmonds 7-14-46 (L); YAKIMA co.: Yakima Valley (A) (14). LARVAL ASSOCIATIONS: *Culex apicalis* Adams, *C. tarsalis* Coq., *C. pipiens* L., *Culiseta inornata* (Will.).

31. *MANSONIA PERTURBANS* (Walker). KING co.: Seattle 7-8-37 (A) (M. H. Hatch collection); YAKIMA co.: Yakima Valley 7-31-41 (L) (8).

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